

Remarks

The examiner has rejected claims 1-9 under 35 U.S.C. 112. The claims have been amended as suggested by the examiner and, thus, it is believed that this rejection has been overcome.

Claims 1-9 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Bross et al, U.S. Patent 5,517,751, hereinafter Bross et al, in view of Kawakita et al, U.S. Patent 5,817,404, hereinafter Kawakita et al, and Pommer, U.S. Patent 6,560,844, hereinafter Pommer. This rejection is not thought to be well taken.

Claim 1 is the only independent claim in the application, and it is not believed that any reasonable combination of Bross et al, Kawakita et al and Pommer teaches or suggests the method of claim 1.

Claim 1 is directed to a method of forming a laminated composite structure from at least three subcomposite structures. A plurality of at least three subcomposite structures, each having a plurality of via openings therein, is provided. Each via opening is positioned to align with a via opening in at least one other subcomposite structure. Each via opening is filled with a conductive paste material that can be hardened or cured with a conductive paste extending from another opening. A plurality of aligned index openings is provided in each subcomposite structure for via opening alignment. An adhesive is provided between subcomposite structures to join them together. The subcomposite structures are laid up on a fixture having elements extending through the index holes for via opening alignment. The conductive paste is then fully cured to form a composite structure.

First, and as noted by the examiner, Bross et al do not teach or suggest the use of curable conductive paste. Rather, Bross et al teach the use of solid conductive material either inserted into, or molded into, the via openings (column 3, lines 1-23). Thus, there is no suggestion of the use of

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conductive paste, which is later cured to form the composite structure. The only two techniques disclosed by Bross et al are compression bonding of the metal inserts, and the use of low melting solder at the tips of the inserts. Both of these have their problems. With the compression techniques, when there are a significant number of vias, the inserts will tend to bend and not bond properly under the high force necessary. The problem of melting additional material for bonding contributes to poorly formed bonds and the possibility of shorting. In applicants' application, the plastic nature of the paste allows it to deform and form good bonds. In any event, Bross et al do not teach the use of a curable conductive adhesive. Moreover, Bross et al are silent as to how the various components are aligned for joining, and joining by curing the paste. It is also to be noted that some of the filled vias of Bross et al do not align with filled vias in any other subcomposite structures.

While it is true that Kawakita et al show the use of conductive paste, it is in an entirely different context, and would not suggest to one skilled in the art that it could be used in Bross et al. In Kawakita et al, the conductive paste is used in a totally different way. In this patent, the conductive paste is used to connect the circuitry on one side of a board to the circuitry on the other side of the board. In all cases, the paste is capped with a portion of the circuitry on both sides of the board. Thus, the paste is not available to interconnect two boards by bonding of the paste in the vias. Indeed, there is nothing to indicate that the paste is partially cured in order to interconnect with other paste.

While it is true that Pommer shows posts for alignment of various components, it is not for the purpose of aligning filled vias for final cure.

In rejecting claims under 35 U.S.C. §103, it is incumbent upon the examiner to establish a factual basis to support the legal conclusion of obviousness. See In re Fine, 837 F.2d 1071, 1073, 5
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USPQ2d 1596, 1598 (Fed. Cir. 1986). In so doing, the examiner is expected to make the factual determinations set forth in Graham v. John Deere Co., 383 U.S. 1, 17, 148 USPQ 459, 467 (1966), and to provide a reason why one having ordinary skill in the pertinent art would have been led to modify the prior art or to combine prior art references to arrive at the claimed invention. Such reason must stem from some teaching, suggestion or implication in the prior art as a whole or knowledge generally available to one having ordinary skill in the art. Uniroyal, Inc. v. Rudkin-Wiley Corp., 837 F.2d 1044, 1051, 5 USPQ2d 1434, 1438 (Fed. Cir.), cert. denied, 488 U.S. 825 (1988); Ashland Oil, Inc. v. Delta Resins & Refractories, Inc., 776 F.2d 281, 293, 227 USPQ 657, 664 (Fed. Cir. 1985), cert. denied, 475 U.S. 1017 (1986); ACS Hosp. Sys., Inc. v. Montefiore Hosp., 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984). These showings by the examiner are an essential part of complying with the burden of presenting a prima facie case of obviousness. Note In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992).

In this case, there is no teaching or suggestion, reason or motivation for combining the references and, even if one were to do so, the resulting structure would be different.

Claims 2-9 depend from claim 1 and, for the same reasons, are believed to be allowable. In addition, claim 2 requires that the adhesive material be in the form of a separate sheet of material.

This is not taught nor suggested by any of the references. For this additional reason, it is believed that claim 2 is allowable.

Claims 3 and 5 require that at least some of the via openings have plated surfaces. This is not taught nor suggested by either Bross et al or Kawakita et al. Thus, claims 3 and 5, for this additional reason, are believed to be allowable.

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Claim 6 requires the paste be partially cured before lamination. This is not taught nor suggested by Kawakita et al. For this additional reason, it is believed that claim 6 is allowable.

Claim 7 requires that the vias be filled with the conductive paste through a mask. This is not taught nor suggested by Kawakita et al (See column 7, lines 10-12). For this additional reason, it is believed that claim 7 is allowable.

Claim 8 requires registration of both the subcomposite and the mask. This is not taught nor suggested by any reference. For this additional reason, it is believed that claim 8 is allowable.

In view of the above, reconsideration and allowance of all of the claims is respectfully requested.

Respectfully submitted,

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